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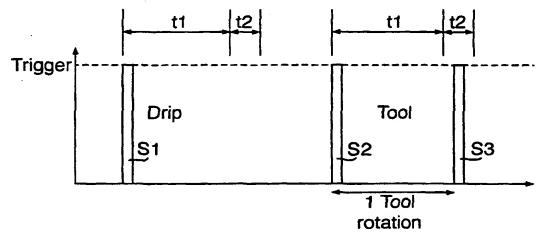
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(54) Title: OPTICAL MEASURING APPARATUS FOR MEASURING OBJECTS ON MACHINES



(57) Abstract: A light source generates a beam of light which is incident on a detector which generates a trigger signal when the beam incident upon it is occluded by a tool. To avoid trigger signals being produced when the beam is temporarily occluded by coolant drips passing through the beam, the detector produces a detection signal each time the beam is occluded, but only produces a trigger signal if a further detection signal is produced in a specified time interval from the generation of an earlier detection signal. One method of generating the time interval is by rotating the tool so that the beam is occluded at time intervals (t1) each time a cutting edge of the tool enters the beam. If no second signal is generated within an interval (t2) at the end of interval (t1) no trigger signal is produced.



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4. Date of timely receipt of the required corrections under PCT Article 11(2): 5. International Searching Authority (if two or more are competent): 6. Transmittal of search copy delayed until search fee is paid.	timely received papers of	drawings completing			
(if two or more are competent): ISA/ until search fee is paid.	corrections under PCT A	rticle 11(2):			
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See Notes to the request form



A. CLASSIFICATION OF SUBJECT MATTER IPC 7 G01B11/00 H03K17/94

G01V8/10

B23Q17/24

B23B49/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

 $\begin{array}{lll} \mbox{Minimum documentation searched (classification system followed by classification symbols)} \\ \mbox{IPC 7} & \mbox{G01B} & \mbox{H03K} & \mbox{G01V} & \mbox{B23Q} & \mbox{B23B} \\ \end{array}$

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, EPO-Internal, PAJ

C. DOCUM	ENTS CONSIDERED TO BE RELEVANT	
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 39 05 949 A (SCHULZ HERBERT PROF DR ING; MOOTZ ANDREAS DIPL ING (DE)) 30 August 1990 (1990-08-30) column 5, line 3-13,49-56; figures	1-3,9,10
X	EP 0 511 117 A (NIPPON TELEGRAPH & TELEPHONE) 28 October 1992 (1992-10-28) claim 1	1
Α	US 4 502 823 A (CARLSON JEFFREY J ET AL) 5 March 1985 (1985-03-05) the whole document	1-10
Α	DE 43 23 910 A (LEUZE ELECTRONIC GMBH & CO) 19 January 1995 (1995-01-19) abstract; figure 3	1

X Further documents are listed in the continuation of box C.	Patent family members are listed in annex.		
Special categories of cited documents :	"T" later document published after the international filing date or priority date and not in conflict with the application but		
"A" document defining the general state of the art which is not considered to be of particular relevance	cited to understand the principle or theory underlying the invention		
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"P" document published prior to the international filing date but later than the priority date claimed	in the art. "&" document member of the same patent family		
Date of the actual completion of the international search	Date of mailing of the international search report		
2 March 2001	13/03/2001		
Name and mailing address of the ISA	Authorized officer		
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Westhues, T		



		GB 00/04403
C.(Continua	ation) DOCUMENTS CONSIDERED TO BE RELEVANT	
Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	US 3 772 523 A (MONTANVERT M ET AL) 13 November 1973 (1973-11-13) column 5, line 21-43; figure 4	1
A	EP 0 584 510 A (LEUZE ELECTRONIC GMBH & CO) 2 March 1994 (1994-03-02) abstract; claims 1,4; figure 3	1
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	nt document search report		Publication date		Patent family member(s)	Ī		Publication date
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		•		JP	432840			17-11-1992
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				DE	593090			29-10-1998

national Application No PCT/GB 00/04403

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G01R11/00 B23Q17/24 B23B49/00 H03K17/94 G01V8/10 According to International Patent Classification (IPC) or to both national classification and IPC B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) G01B H03K G01V B23Q B23B IPC 7 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practical, search terms used) WPI Data, EPO-Internal, PAJ C. DOCUMENTS CONSIDERED TO BE RELEVANT Relevant to claim No. Category ° Citation of document, with indication, where appropriate, of the relevant passages DE 39 05 949 A (SCHULZ HERBERT PROF DR ING 1-3,9,10X ; MOOTZ ANDREAS DIPL ING (DE)) 30 August 1990 (1990-08-30) column 5, line 3-13,49-56; figures EP 0 511 117 A (NIPPON TELEGRAPH & 1 X TELEPHONE) 28 October 1992 (1992-10-28) claim 1 1 - 10US 4 502 823 A (CARLSON JEFFREY J ET AL) Α 5 March 1985 (1985-03-05) the whole document DE 43 23 910 A (LEUZE ELECTRONIC GMBH & 1 Α CO) 19 January 1995 (1995-01-19) abstract; figure 3 -/--Further documents are listed in the continuation of box C. Patent family members are listed in annex. Special categories of cited documents: later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the A document defining the general state of the art which is not considered to be of particular relevance invention "E" earlier document but published on or after the international "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) involve an inventive step when the document is taken alone document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such docu-*O* document referring to an oral disclosure, use, exhibition or ments, such combination being obvious to a person skilled *P* document published prior to the international filing date but later than the priority date claimed in the art. *&* document member of the same patent family Date of the actual completion of the international search Date of mailing of the international search report 13/03/2001 2 March 2001 Name and mailing address of the ISA Authorized officer European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo ni, Fax: (+31-70) 340-3016

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Westhues, T



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	ction) DOCUMENTS CONSIDERED TO BE RELEVANT	Dolovent to claim No.
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A	EP 0 584 510 A (LEUZE ELECTRONIC GMBH & CO) 2 March 1994 (1994-03-02) abstract; claims 1,4; figure 3	1
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Information on patent family members

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DE	3905949	Α	30-08-1990	WO 9010192 A	07-09-1990
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DE	4323910	Α	19-01-1995	NONE	
US	3772523	Α	13-11-1973	FR 2123753 A CA 997452 A DE 2204093 A GB 1373995 A	15-09-1972 21-09-1976 10-08-1972 13-11-1974
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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER see Notification of Transmittal of International Search Report			
483W0	ACTION (Form PCT/ISA/220) as well as, where applicable, item 5 below			
International application No.	International filing date (day/month/year)	(Earliest) Priority Date (day/month/year)		
PCT/GB 00/04403	17/11/2000	22/11/1999		
Applicant				
DENTSHALL DIC at all				
RENISHAW PLC et al.				
T.:				
according to Article 18. A copy is being tra	n prepared by this International Searching Auth ansmitted to the International Bureau.	nority and is transmitted to the applicant		
	2			
This International Search Report consists It is also accompanied by	of a total of Sheets. a copy of each prior art document cited in this	report		
,				
1. Basis of the report				
a. With regard to the language, the language in which it was filed, unl	international search was carried out on the bas ess otherwise indicated under this item.	sis of the international application in the		
the international search w Authority (Rule 23.1(b)).	ras carried out on the basis of a translation of th	ne international application furnished to this		
b. With regard to any nucleotide an was carried out on the basis of the	d/or amino acid sequence disclosed in the in	ternational application, the international search		
F	e sequence listing : enal application in written form.			
	rnational application in computer readable form	1.		
furnished subsequently to	this Authority in written form.			
furnished subsequently to	this Authority in computer readble form.			
the statement that the sub international application a	sequently furnished written sequence listing do s filed has been furnished.	oes not go beyond the disclosure in the		
the statement that the info furnished	ormation recorded in computer readable form is	identical to the written sequence listing has been		
2. Certain claims were fou	nd unsearchable (See Box I).			
3. Unity of invention is lack	king (see Box II).			
4. With regard to the title,				
X the text is approved as su	bmitted by the applicant.			
=	hed by this Authority to read as follows:			
_				
5. With regard to the abstract,				
the text is approved as su	bmitted by the applicant.			
the text has been establis within one month from the	hed, according to Rule 38.2(b), by this Authorited at the date of mailing of this international search rep	y as it appears in Box III. The applicant may, ort, submit comments to this Authority		
The figure of the drawings to be publication		2		
X as suggested by the appli		None of the figures.		
because the applicant faile				
because this figure better	characterizes the invention.			

LIONAL SEARCH REPORT

nal Application No PCT/GB 00/04403

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 G01B11/00 H03K17/94

G01V8/10

B23Q17/24

B23B49/00

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B. FIELDS SEARCHED

 $\begin{array}{lll} \mbox{Minimum documentation searched (classification system followed by classification symbols)} \\ IPC & 7 & G01B & H03K & G01V & B23Q & B23B \end{array}$

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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WPI Data, EPO-Internal, PAJ

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Y Further documents are listed in the continuation of box C.	Patent family members are listed in annex.
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Date of the actual completion of the international search	Date of mailing of the international search report
2 March 2001	13/03/2001
Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Westhues, T



Internal Application No PCT/GB 00/04403

Category °	citation) DOCUMENTS CONSIDERED TO BE RELEVANT Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
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	EP 0 584 510 A (LEUZE ELECTRONIC GMBH & CO) 2 March 1994 (1994-03-02) abstract; claims 1,4; figure 3	1		

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Patent document cited in search report			Publication date	Patent family member(s)		Publication date
DE	3905949	Α	30-08-1990	WO	9010192 A	07-09-1990
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US	4502823	Α	05-03-1985	NONE	-	
DE	4323910	Α	19-01-1995	NONE		
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